Natural Capital Assessment of Yorkshire Water's capital scheme at Rivelin Water Treatment Works: A Case Study

Introduction

Following the development of their corporate level Environmental Profit and Loss Account (eP&L) in 2013, Yorkshire Water continues to enhance the way it factors non-financial considerations into its decision making. Most recently the organisation has taken steps to begin embedding a natural capital approach at an operational level.

Context

Natural capital is the world's stock of natural resources, including air, rivers, forests, soil and all living things. These resources combine to provide ecosystem services – the flow of benefits provided by natural capital that are valued by people, for example food production and climate regulation.

Figure 1: The five capitals

However, natural capital is only one of several types of capital relied on (and impacted) by organisations (see Figure 1). It is therefore important to set natural capital assessment in the context of Yorkshire Water's emerging work on Total Impact Assessment, which is currently being developed. This is especially important for an organisation like Yorkshire Water that has a complex mix of natural, financial and social (as well as other) inputs and outputs to consider in its decision making.

Overview

AECOM assisted Yorkshire Water in testing the application of the Natural Capital Coalition's draft Natural Capital Protocol (the Protocol) to a trial site at Rivelin Water Treatment Works. This site is one of the primary water treatment plants supplying the City of Sheffield and is undergoing a £24m capital upgrade scheme to ensure the continued reliable supply of high quality water. A number of high level options were initially considered before two main solutions were assessed in more detail. This pilot retrospectively evaluated the natural capital impact of the two upgrade solutions (the 'notional' and the 'chosen' solution) compared to the existing baseline infrastructure (see Figure 2).

Figure 2: Summary of alternative solutions for the Rivelin site

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Our Approach

The approach taken followed the framework set out in the Protocol. This follows four broad stages: to frame, scope, measure and value, and ultimately apply the Natural Capital Assessment (see Figure 3).

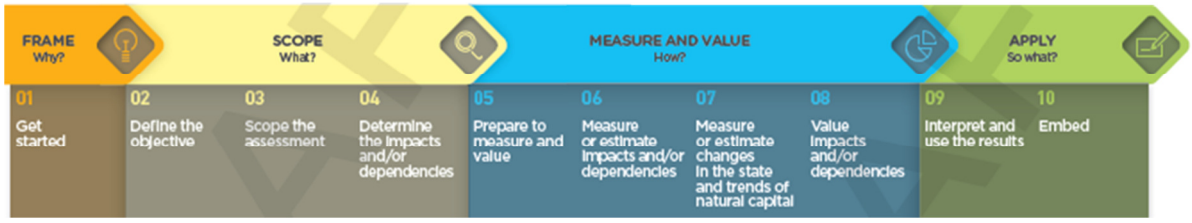

Figure 3: Natural Capital Protocol framework overview

FRAME STAGE: Why?

Undertaking a retrospective natural capital assessment allowed Yorkshire Water to assess how the Protocol's framework could be developed and ultimately embedded into day-to-day business decision-support processes. By embedding natural capital assessments in operational practices such as the optioneering process, Yorkshire Water aims to better understand the environmental impacts and trade-offs associated with its business. This will enable Yorkshire Water to better inform investments and operations, protecting and enhancing value for both the company and its stakeholders. In other words, it facilitates Yorkshire Water's ability to deliver the social imperative of essential water and waste water services, whilst minimising negative and maximising positive natural capital impacts.

This supports Yorkshire Water's vision 'Taking responsibility for the water environment for good' and its six key strategic objectives:

Figure 4: Yorkshire Water's six key strategic objectives

SCOPE STAGE: What?

The assessment was scoped with reference to potentially materially impacted ecosystem services. These were identified using AECOM's in-house Ecosystem Services Identification, Valuation and Integration (ESIVI) tool, which uses a series of criteria to categorise the potential change in ecosystem services. This includes the number of beneficiaries affected by the services, the importance of each service to the local area and communities, and the degree of management control of the delivery of these services on the project site.

The most important impacted ecosystem services for the Rivelin project were identified to be:

- Global climate regulation
- Air quality
- Pollination
- Cultural and spiritual values

An impact pathway was mapped for each material ecosystem service to guide the valuation methodology. These pathways included consideration of the key business activities that may drive change to the environment (both positive and negative), which receptors may be affected, how natural capital is impacted, and how these impacts may be measured. They also include an indication of the robustness of the valuation approach (considering both methodology and data availability) by using a red, amber, green scoring system. This aims to provide transparency and to guide confidence in the assessment results.

The impact pathway for pollination services is shown below as an example:

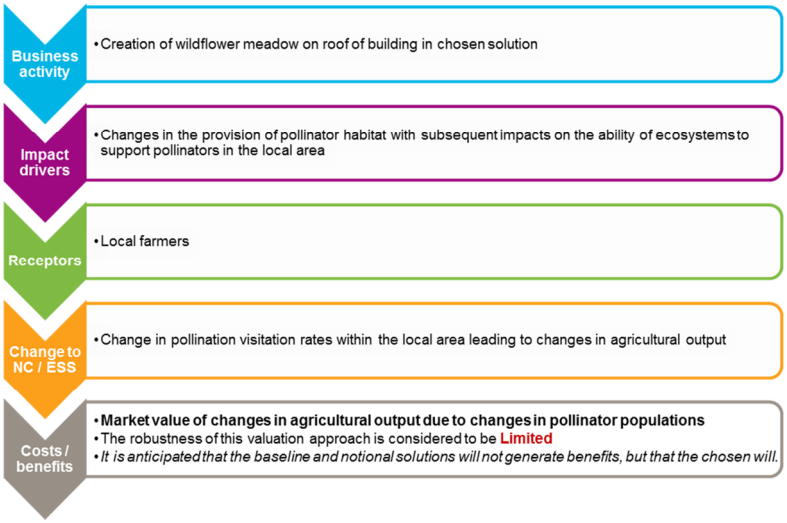

Figure 5: Impact pathway for pollination services

Methodologies for estimating the monetary value of each material service were selected, as far as possible, on the basis of relationships determined from the peer-reviewed academic literature (with a focus on highly-cited papers) and government guidance. The robustness of each selected valuation methodology was then assessed and categorised, to maintain transparency through the valuation process.

The most material ecosystem service impact was found to be global climate regulation, with the associated valuation approach classified as being of 'Good' robustness (the highest rating available) due to established methods for calculating estimated abatement costs. Pollination services provided by the chosen solution were found to have a lower value than global climate regulation, however the robustness of the valuation method was classified as 'limited' as the services that pollinators provide are highly varied, site specific and therefore difficult to parametrise. However, excluding these values from the assessment would mean these services remain economically invisible, and ultimately result in a partial assessment. The approach was therefore taken to prioritise completeness over accuracy in this case and to include pollination services whilst disclosing the limitations of the estimates.

Outcomes

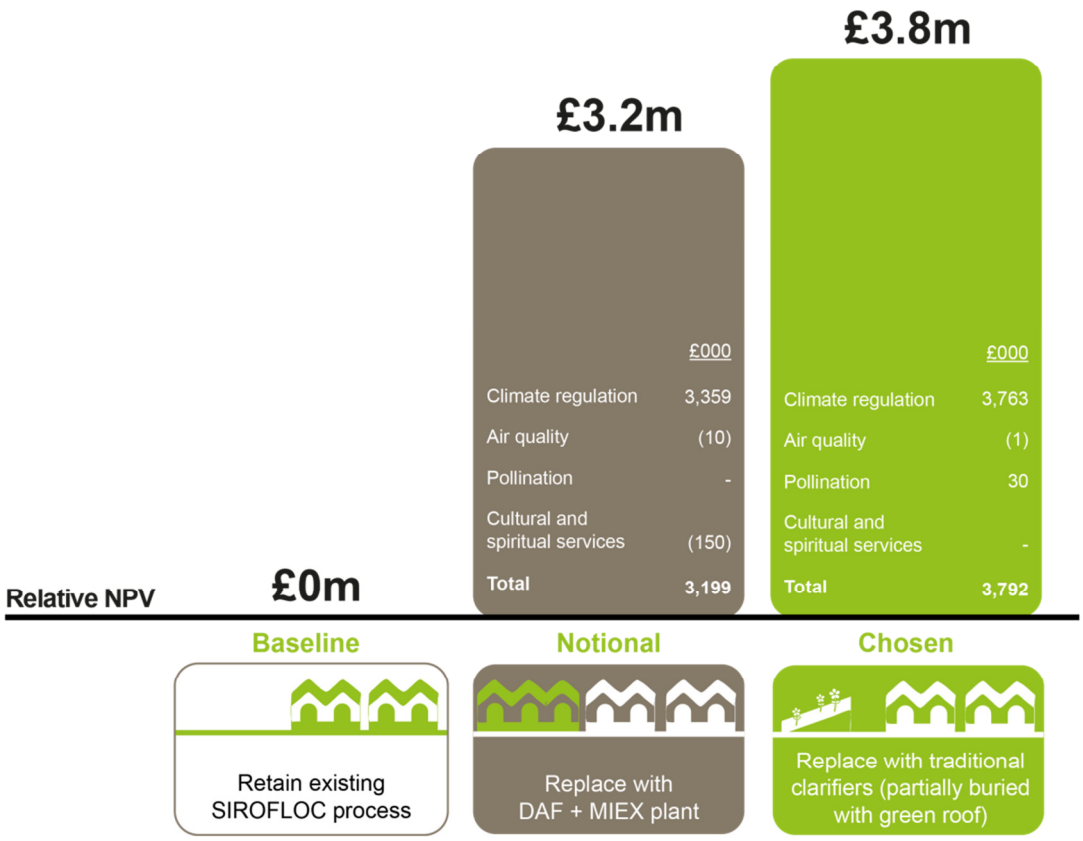

Figure 6: Summary of the Net Present Values (NPV) of the three solutions

The assessment confirmed that the chosen solution provided the least negative and most positive environmental impacts. This was achieved, for example, by reducing impacts on global climate regulation through the use of a gravity-fed system reducing energy requirements, maintaining cultural and spiritual values by partially burying the building and enhancing pollination services by creating a wildflower meadow on the building's roof. The latter two approaches also assisted in obtaining planning permission.

By monetising the material environmental impacts, the assessment enabled direct comparison with more obvious costs and benefits, and therefore, richer debate on environmental impacts than might occur traditionally. Whilst this assessment was carried out retrospectively in this pilot test project, application early on in the design and optioneering phases of a capital scheme would provide new insight to enhance decision making and risk management.

The assessment showed that whilst optioneering for the project delivered a significantly less environmentally damaging solution, an adverse impact on carbon emissions was unavoidable in meeting the social imperative for safe and reliable drinking water. A total impact assessment, considering all relevant environmental, financial and social attributes of a scheme would demonstrate trade-offs and enable even richer decision-making than a focus on only natural capital.

Application

The benefits of undertaking this type of assessment include provision of hard numbers to inform decisions, thereby facilitating the effective inclusion of environmental issues (risks and opportunities), and supporting rich dialogue on 'softer issues' with stakeholders.

A workshop with representatives from business units across Yorkshire Water sought to build on the outcomes of the pilot assessment to discuss how a natural capital approach could be implemented across the business. This revealed several points relevant for any business seeking to apply a natural capital approach:

i. It is important to find a simple, repeatable methodology that can be readily used and linked with existing data processes and systems.
ii. There is a need to consider 'the full picture' when making decisions, for example social capital impacts will often also need to be considered as there are often trade-off's.
iii. Including explicit statements of the uncertainty/robustness of the results aids decision-makers.
iv. There is a need to engage across a range of business functions that are potentially key users of the natural capital approach to ensure any method is fit for purpose.
v. Some ecosystem services are harder to value than others. It is important to develop a replicable, comparable and transparent methodology for measuring less tangible services, such as cultural and spiritual - noting point (iii) above regarding robustness of results.

For more detail a full report is available at:
https://www.yorkshirewater.com/about-us/what-we-do/sustainable-resources.